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(71) Applicant *(for all designated States except US)*: **OPTITUNE PUBLIC LIMITED COMPANY** [GB/GB]; St George's House, 61-65 Conduit Street, London WIR 9FD (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **KARKKAINEN, Ari** [FI/FI]; Kontiotie 7 #F 69, Fin-90530 Oulu (FI).

(74) Agent: **DUTTON, Erica**; Rosemount, Pednorvale Road, Chesham, Buckinghamshire HP5 2ST (GB).

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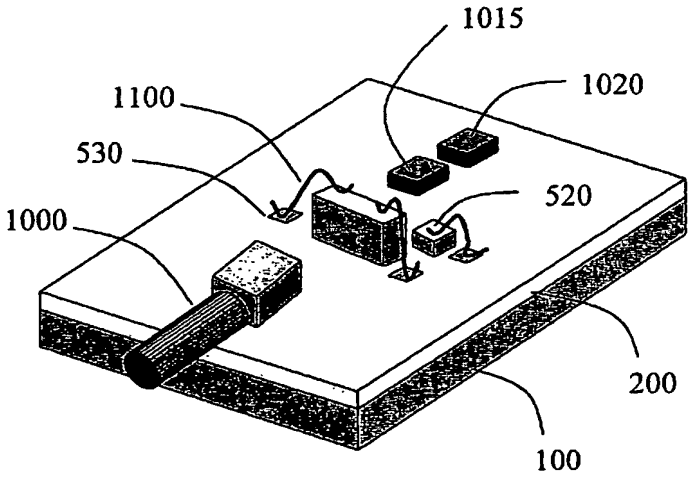
Declaration under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES,*

[Continued on next page]

(54) Title: ELECTRONIC COMPONENT PACKAGING AND ASSEMBLY



(57) Abstract: A packaging layer (200) for a wafer level assembly is fabricated from a glass material comprising both inorganic and organic components. This allows matching between the coefficient of thermal expansion of the packaging layer and that of other materials in the wafer assembly, particularly electrical interconnect materials. It is also possible to introduce properties to support such methods as photolithographic and low temperature processing of the packaging layer. This can improve fabrication accuracy and allows the packaging layer to be used with structures in a wafer assembly which might be damaged by high temperature processing, such as active optoelectronic devices and integrated circuits. Another major advantage is that the glass material can be used to provide optical characteristics as well as mechanical protection. The refractive index and other optical properties can be preselected and thus the glass material can be used for instance for waveguiding and index matching.

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FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AMENDED CLAIMS

[received by the International Bureau on 2 June 2004 (02.06.04);
Original claims 48-50 and 53 amended; remaining claims unchanged (2 pages).]

42. A substrate-based assembly according to Claim 41, further comprising an optical modulator, external to the laser or tunable optical source.

43. A substrate-based assembly according to any one of the preceding claims wherein the substrate-based assembly comprises a thick substrate-based assembly.

44. A substrate-based assembly according to any one of the preceding claims wherein the substrate-based assembly has a thickness in the range from 1 micron to 1 millimetre.

45. Opto-electronic equipment comprising a substrate-based assembly according to any one of the preceding claims.

46. A method of packaging a substrate-based assembly, which method comprises the step of providing a packaging layer comprising a glass material having both organic and inorganic components.

47. A method of packaging a substrate-based assembly according to Claim 46, wherein the method further comprises the step of lithographic processing of the packaging layer.

48. A method of fabricating a substrate-based assembly, the assembly comprising at least one optical component mounted in relation to a substrate, the method comprising lithographic processing of each fabricated layer of the substrate-based assembly, at least one fabricated layer comprising a glass material having both organic and inorganic components.

49. A method of fabricating a substrate-based assembly, the assembly being according to any one of Claims 1 to 44, using bump bonding material to bump bond at least one optical component to a mounting pad, wherein the method comprises the steps of:

a) maintaining the temperature of the bump bonding material above a softening temperature for the material and micro-manipulating the component in relation to the mounting pad; and

b) lowering the temperature of the bump bonding material to below said softening temperature so as to achieve bump bonding.

50. A method of fabricating a substrate-based assembly comprising the step of using gray scale lithography to fabricate a groove of tapered cross section in a packaging layer for mounting a fibre for optical coupling with an optical component, said packaging layer comprising a glass material having both organic and inorganic components.

51. A method of fabricating a substrate-based assembly according to any one of clams 1 to 44 which comprises the step of depth adjustment in a packaging layer.

52. A method of fabricating a substrate-based assembly according to Claim 51 wherein said step of depth adjustment comprises the use of a lithography mask having non-uniform optical density.

53. A method of fabricating a substrate-based assembly comprising the steps of applying an electrical interconnect structure to a surface, applying a planarisation layer over the electrical interconnect structure and creating one or more apertures in the planarisation layer to give access to the electrical interconnect structure, said planarisation layer comprising a glass material having both organic and inorganic components.